substrate to which a plasma process is applied. A plasma processing method can be performed by such a plasma processing apparatus.

A1

Page 1, delete the whole paragraph starting in line 6, and replace it with the following new paragraph:

Etching of a silicone oxidization film or a polycrystalline silicon film is an important process in the production of a semiconductor, and plasma etching has been used as such etching. In order to form a fine pattern of 1.0 μm or less by plasma etching, plasma having an ion current density of 1 mA/cm^2 or more and an electron density of 1×10 cm^{-3} or more is generally required under a process pressure of 0.5 Pa or less. However, a conventionally used RIE apparatus of a parallel plate type was not able to generate plasma of such conditions.

A2

Page 2, delete the whole paragraph starting in line 6, and replace it with the following new paragraph:

A solution which attains equalization of plasma density and a self-bias voltage, e.g., a method of giving a slope to a magnetic field (Japanese Laid-Open Patent Application No. 62-21062) or a method of rotating a magnetic field introduced into a process space (Japanese Laid-Open Patent Application No. 61-208223), has been suggested. However, the solution suggested in Japanese Laid-Open Patent Application No. 62-21062 has a problem in that the optimum value of a slope magnetic field changes when a process pressure etc. is changed. Additionally, although the solution suggested in Japanese Laid-Open Patent Application No. 61-208223 apparently achieves equalization of plasma with respect to a substrate being processed, the mechanism for rotating the magnetic field is required, and there is a problem in that a miniaturization of the whole plasma apparatus is difficult.

A3

Page 3, delete the whole paragraph starting in line 5, and replace it with the following new paragraph:

However, in association with increase of sizes of semiconductor chips such as DRAM or MPU, the diameter of the silicone substrate used as a base thereof has become gradually larger. For example, in order to suppress a pressure distribution to less than several percent in the plasma apparatus which processes a substrate having a diameter of 300 mm or more, it is necessary to set a distance between the substrate and an upper electrode as 30 mm or more. In such a distance, diffusion of electrons which go from the surface of the substrate to the surface of the auxiliary electrode and from the auxiliary electrode to the surface of the substrate is suppressed. As a result, a movement of electrons is prevented and it is difficult to equalize the plasma.

Page 4, line 7, the heading is changed to the following:

SUMMARY OF INVENTION

Page 4, delete the whole paragraph starting in line 25 and extending over to page 5, and replace it with the following new paragraph:

In order to achieve the above-mentioned objects, there is provided a plasma processing apparatus comprising a first electrode on which a substrate subjected to a plasma process is placed and a magnetic field generator for applying a magnetic field to a surface of the substrate to which the plasma process is applied. An auxiliary electrode is provided on an outer periphery of the first electrode to excite plasma by the auxiliary electrode so as to

cause electrons in the plasma to drift from a front surface to a back surface of the auxiliary electrode and from the back surface to the front surface of the auxiliary electrode.

Page 5, delete the whole paragraph starting in line 5, and replace it with the following new paragraph:

The front surface of the auxiliary electrode may be covered by an insulating material. Additionally, it is preferable that a level of a surface of the substrate placed on the first electrode and a level of the front surface of the auxiliary electrode be substantially equal to each other or within ±2 mm. The magnetic field generator may comprise a dipole ring-magnet. It is preferable that a first frequency of a radio frequency applied to the first electrode and a frequency of a radio frequency applied to the auxiliary electrode be substantially equal to each other and phases thereof are different from each other. Further, it is preferable that a frequency f2 of a radio frequency applied to the auxiliary electrode is higher than a frequency fl of a radio frequency applied to the first electrode (f2>fl).

Page 7, line 7, the heading is changed to the following:

DETAILED DESCRIPTION OF EMBODIMENTS

Page 7, delete the whole paragraph starting in line 11, and replace it with the following new paragraph:

FIG. 1 is a structural diagram of a plasma processing apparatus according to a first embodiment of the present invention. In the plasma processing apparatus shown in FIG. 1, a substrate 101 to which a plasma process is applied is placed on an electrode 102. A plasma process is applied to the substrate 101 by exciting plasma on the surface of the substrate 101.

A magnetic field generator, e.g. a dipole ring-magnet, 103 is provided in the circumference of a process chamber 108 in which the substrate 101 is accommodated to apply a magnetic field. Although the magnetic field generated can be a permanent magnet or an electromagnet, it is preferable to use a dipole ring-magnet when installation capacity, electric power consumption, magnetic field leakage, etc. are taken into consideration.

Page 18, delete the whole paragraph starting in line 12, and replace it with the following new paragraph:

Additionally, using the plasma etching apparatus shown in FIG. 1, a silicon substrate was etched 300 times by introducing a mixed gas of C_4F_8, carbon monoxide, oxygen, and xenon into the process chamber and setting the pressure to 5 Pa. The silicone substrate had a silicone oxidization film with a thickness of 1.6 μm formed on the surface thereof and the diameter thereof was 200 mm. As a result measurement of the amount of consumption of eh auxiliary electrode 104, the amount of consumption was about 5 mm. Since the amount of consumption in a conventional etching apparatus is generally 65 mm, the amount of consumption was reduced to 1/13 of that of the conventional apparatus.

IN THE CLAIMS:

Please enter the following amended claims.

1. (Amended) A plasma processing apparatus comprising:

a first electrode;

a substrate configured to be subjected to a plasma, the substrate being positioned on the first electrode;